

of this in the mixing of soda powders where tartaric acid is mixed with carbonate of soda; here the tartaric acid, being the stronger, expels the carbonic acid and unites to the soda, the carbonic acid causing effervescence as it escapes. When sulphuric acid is added to bones it drives a part of the phosphoric acid from their lime and unites to it, forming sulphate of lime, (gypsum, or plaster of Paris.) The phosphoric acid thus set free does not escape, as would carbonic acid, but either unites to a smaller proportion of lime, or is left alone in solution, according to the quantity of sulphuric acid employed. To convert 100 parts of pure phosphate of lime into the biphosphate, 45 parts of absolute or pure sulphuric acid must be added; we then shall have about 68 parts of biphosphate of lime and 77 parts of sulphate of lime or gypsum, and we have in the mixture biphosphate and sulphate of lime mixed mechanically together.

When this compound is added to the soil, from its extreme solubility it is carried to every part of it, and there meeting with lime or other bases it is reconverted into the neutral phosphate again, or if it meets with potash or soda into the phosphate of these bases. So, although it may eventually be restored to the same compound, nevertheless a most important and vital point has been gained. When dissolved, it has entered into every pore in the soil, has come in contact with every particle of earth, and has become most intimately blended with the earth to be cultivated; so that from its minute subdivision, every point in the soil can furnish to the plant this material for its support; for other things being equal, the solubility of bodies is in proportion to the fineness of their divisions, and all manures must be dissolved before they can act on vegetation. It becomes then a matter of great interest to the consumer to have his bone dust not only dissolved, but to have it treated afterwards with such substances as will not reproduce the original compound, if lime be employed, this will take place, and though we may have bones reduced to a very fine state of division, yet we have to rely on mechanical means to mix them with the soil instead of the thorough and complete mixture which takes place when they are applied in a soluble state, and thus reach every atom of the soil.—This is a point of the highest importance and should always be *strictly* attended to.

*Mode of Treatment and Quantity of Acid to be used.*—Without going into the reasons and showing the calculations from which they were formed, I will here state that for every hundred pounds of bones to be acted on, about thirty-three pounds of sulphuric acid of specific gravity of 1.70 should be used; of course the quantity of commercial acid is to be increased when it is of less specific gravity. The bones should be finely ground and then moistened with water, after which the acid should be gradually added, and the mass thoroughly stirred. This is important to be attended to,